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Understanding the Willingness to Participate in Mobile Surveys: Exploring the Role of Utilitarian, Affective, Hedonic, Social, Self-Expressive, and Trust-Related Factors

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Abstract

Mobile technology offers a promising means to collect survey data, though the factors that influence people's willingness to participate in mobile surveys and their actual participation remain unknown. To identify these factors, this study considers six conceptually distinct influences that may relate to the propensity to participate in mobile surveys. Some of them affect technology acceptance and usage of (mobile) technology in general; another set comes from studies of participation in computer-assisted surveys. The proposed unified framework encompasses utilitarian, affective, hedonic, social, self-expressive, and trust-related factors. An empirical study suggests that this framework explains the intention to participate and actual participation well, though of the six factors, hedonic, affective, self-expressive, and trust-related ones are most influential. Utilitarian aspects and beliefs about perceived social pressure to participate do not play significant roles. The authors discuss the practical implications of these results and outline some further research avenues.

Keywords

mobile surveys, participation, nonresponse, extended technology acceptance model

Introduction and Overview

Around the world, mobile phones have become part of people's everyday lives. Approximately 80% of all U.S. adults used mobile phones regularly by the end of 2007 (Fox, 2008), and since the introduction of third-generation (3G) standards, Internet-enabled mobile handsets have achieved even

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greater penetration (Horrigan, 2008). Ubiquitous information search and communication, as well as location-based services, have emerged as the two most apparent classes of applications.

In response to these rapidly changing global trends in mobile technology usage, survey and market researchers work to develop both interviewer- and self-administered approaches to collect primary data using mobile devices. In interviewer-administered surveys, respondents provide their answers using the voice service of their cellular networks, which is similar to traditional, fixed line, computer-assisted telephone interviews (CATI; Couper & Nicholls, 1998). The methodological challenges for such surveys include sampling and recruiting respondents (Gabler & Häder, 2007). With regard to self-administered mobile surveys, a few studies and reports suggest the use of asynchronous mobile messaging services (e.g., short messaging services [SMS], multimedia messaging service [MMS]) to contact respondents and collect their answers (e.g., Bosnjak, Neubarth, Couper, Bandilla, & Kaczmirek, 2008; Hosoe, 2005; Townsend, 2005). This stream of research reveals that text messaging services can be valuable for notifying and contacting respondents in advance to solicit their participation in nonmobile surveys (Bosnjak et al., 2008). However, their chronically low response rates, limited response options, and usability deficits make text messaging–based surveys largely inappropriate for most primary data collection purposes. Another class of self-administered mobile surveys, which represent the focus of this study, features browser-based surveys that appear on mobile devices (e.g., Fuchs, 2007; Tjøstheim, Thalberg, Nordlund, & Vestgården, 2004).

Prior methodological research on mobile surveys (i.e., self-administered, using a mobile device, and browser based) is scarce and tackles measurement and nonresponse issues only casually. Tjøstheim et al. (2004) assess the usability experiences of mobile survey participants and assert that the size of the screen influences their acceptance and future preferences about participating in mobile compared with web-based surveys. These same authors analyze the differences between participants and nonparticipants and find, among a broad set of demographic and usage-related variables, systematic differences for one age segment (30–39-year-old participants are overrepresented among participants compared with nonparticipants), higher participation rates among those whose employer pays their mobile phone bill, and increased participation among those who use the mobile Internet more. However, studies that shed more light on the factors and processes that lead potential respondents to participate in mobile surveys remain missing, to the best of our knowledge.

Therefore, we attempt to develop and empirically test a model that predicts and explains the propensity to participate, as well as actual participation, in mobile surveys. We posit that the decision process that initiates with a request to participate in a mobile survey can be depicted most accurately through the use of a psychological theory of (mobile) technology acceptance and use. Consequently, we adopt and extend Davis's (1986, 1989, 1993) technology acceptance model (TAM), which has received support from ample research pertaining to (mobile) technology acceptance and use in nonsurvey contexts (Ma & Liu, 2004; Taylor & Todd, 1995; Yousafzai, Foxall, & Pallister, 2007a, 2007b).

In what follows, we review the literature associated with our theoretical proposition, as well as several extensions deemed appropriate for mobile survey participation contexts. We also explain our methodology and present the study results. After we discuss the implications of our study, we conclude with some future research directions.

Conceptual Development and Hypothetical Model

With this study, we seek to identify the key factors that may explain the propensity to participate, as well as actual participation, in mobile surveys. These results may suggest some methods and procedures to increase response rates to mobile surveys. Therefore, we start with one of the most widely used and empirically supported multivariate conceptualizations of technology acceptance and use

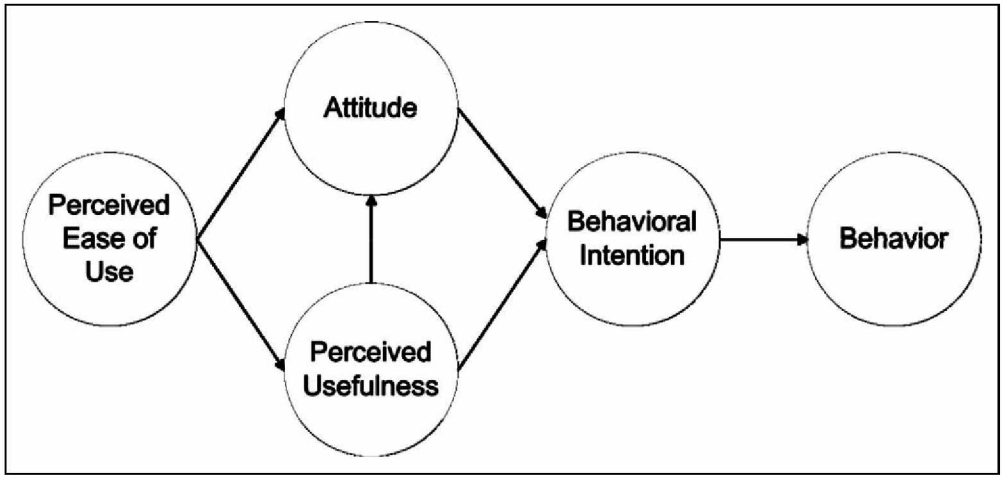

Figure 1. Original TAM structural diagram. Source: Davis, 1986, 1989, 1993.

(TAM), along with selected extensions that may be useful for the mobile survey context. We then turn to our hypothetical model.

The primary purpose of the TAM is evident in its name: Davis (1986, 1989, 1993) designed it to explain computer usage behavior. Because the TAM mainly incorporates findings from information and communication systems literature, it has proven well suited to model the acceptance and usage of services that involve mobile technology (e.g., Bruner & Kumar, 2005; Cheong & Park, 2005; Kleijnen, Wetzels, & deRuyter, 2004; Lee & Jun, 2005; Liao, Tsou, & Huang, 2007; Lu, Yu, Liu, & Yao, 2003; Nysveen, Pedersen, & Thorbjørnsen, 2005; Park & Chen, 2007; Rao & Troshani, 2007).

The TAM cites perceived usefulness and perceived ease of use as the key determinants of technology acceptance behaviors. In the context of surveys that rely on technology, perceived usefulness refers to respondent's perception that a specific technology-dependent service, such as a mobile device, will enable him or her to participate and be more efficient, such as through time savings associated with one mode of participation versus another. Perceived ease of use then captures respondents' expectations about the potential effort required to participate. According to the TAM, perceived ease of use influences perceived usefulness, but not vice versa. As we show in Figure 1, the TAM also states that actual behavior should be determined by behavioral intent, which itself depends on the participants' attitude toward performing the behavior in question, as well as its perceived usefulness.

In a nutshell, the TAM posits that the easier the technology is to use, and the more useful users perceive it to be, the more positive their attitude and intention will be about using that technology. Correspondingly, their usage of the technology should increase. The practical utility of the TAM stems from its focus on perceived usefulness and perceived ease of use, two factors over which technology system designers have some degree of control. To the extent that they are key determinants of usage, they also provide direction about where designers' efforts should focus.

In addition to the vast empirical evidence of the nomological validity, appropriateness, and usefulness of TAM for predicting and explaining a variety of technology usage–related behaviors (Ma & Liu, 2004; Taylor & Todd, 1995; Yousafzai et al., 2007a, 2007b), mounting empirical evidence indicates that the model works well for explaining mobile technology usage (e.g., Bruner & Kumar, 2005; Cheong & Park, 2005; Kleijnen et al., 2004; Lee & Jun, 2005; Liao et al., 2007; Lu et al., 2003; Nysveen et al., 2005; Park & Chen, 2007; Rao & Troshani, 2007).

However, to address some concerns about its sufficiency and predictive validity in light of some conceptually related models including the theory of planned behavior (TPB; Ajzen, 1985, 1991), the TAM has undergone two major extensions and revisions. Venkatesh and Davis (2000) include normative expectations by relevant referent groups as an influence on the propensity to use information technology. These normative beliefs may provide a subjective norm, which should influence usage intentions both directly and indirectly (mediated by perceived usefulness). A recent multivariate meta-analysis by Schepers and Wetzels (2007) corroborates this useful extension of the TAM with a subjective norm construct.

In addition, in research contexts involving information technology, two relevant extensions to the TAM deserve closer attention. First, considerable empirical support exists for including a construct that addresses the anticipated or perceived enjoyment of using the technology (Dabholkar & Bagozzi, 2002; Davis, Bagozzi, & Warshaw, 1992; Moon & Kim, 2001). In technology usage survey contexts, perceived enjoyment should converge conceptually with the idea of survey enjoyment overall, or "the degree to which the respondent likes to participate in survey research (e.g., he or she likes filling out a survey)" (Rogelberg, Fisher, Maynard, Hakel, & Horvath, 2001, p. 7). Second, a proposed TAM extension that refers to perceived trustworthiness emerges as useful in contexts in which technology usage involves the transmission of personal and/or sensitive data, such as when consumers engage in online shopping (Gefen, Karahanna, & Straub, 2003). Perceived trustworthiness implies the data are safe and participation is anonymous, which may be important for survey contexts and could help explain the willingness to participate in both classical (e.g., Konradt & Fary, 2006; Schleifer, 1986) and mobile (Weber, Denk, Oberecker, Strauss, & Stummer, 2008) surveys.

A second TAM extension and revision phase aimed to improve predictions of technology usage intentions by including a broad set of related theoretical perspectives, that is, the unified theory of acceptance and use of technology (UTAUT; Venkatesh, Morris, Davis, & Davis, 2003). The UTAUT assumes technology usage intentions depend on four major clusters of factors: performance expectancy (including perceived usefulness), effort expectancy (which extends perceived ease of use), social influences (subjective norms and image), and facilitating conditions. Their influence on usage intentions is mediated by demographic variables (e.g., gender, age), past behavior (e.g., experience), and the degree of voluntary use.

For our purposes, namely, to explain mobile survey participation, the comprehensive conceptual definition of social influences that encompasses image appears highly relevant. The UTAUT borrows the image concept from Moore and Benbasat (1991), defined as the degree to which technology usage enhances the user's image or status in his or her social system. The notion that symbolic, self-expressive values of using technology may influence its acceptance reflects recent research on mobile phone and mobile service adoption (Foley, Holzman, & Wearing, 2007; Mannetti, Pierro, & Livi, 2002; Thorbjørnson, Pedersen, & Nysveen, 2007; Walsh & White, 2007). But how does image actually influence acceptance; what is the causal link or mechanism between image perception and its relevance to an individual user? Consumer behavior research mainly considers the effect of image in light of self-image congruity theory (Sirgy, 1986), which posits that the closeness of an object or behavior to the user's actual or desired self-image influences a broad set of adoption-related constructs. When the images are close to an actual or desired self-image, subjects likely hold favorable attitudes toward and actually adopt the image object (e.g., buy a consumer good, comply with a behavior, accept a technology).

In summary, and in view of our overall goal to develop a unified framework, we propose six conceptually distinct factors as possible explanations of mobile survey participation: (a) affective (attitude toward participation), (b) hedonic (perceived enjoyment), (c) social (subjective norm), (d) self-expressive aspects (self-congruity), (e) utilitarian aspects (perceived usefulness and perceived costs [Cheong & Park, 2005]), and (f) trust considerations (perceived trustworthiness). That is, participation in mobile surveys may be associated with the costs incurred (Cheong & Park, 2005)

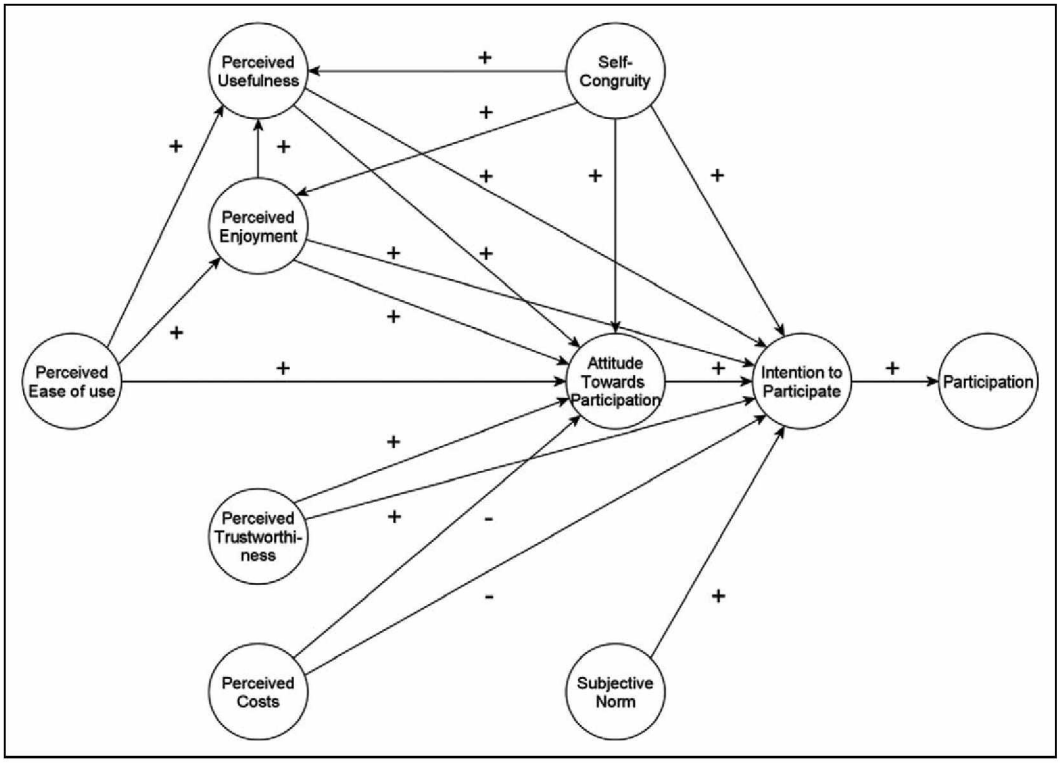

Figure 2. Hypothetical structural model of mobile survey participation.
Notes: + indicates an expected positive relationship, − denotes a negative expected relationship.

or concerns about the anonymity, security of data, and trustworthiness when participating in mobile surveys (Lu, Liu, Yu, & Wang, 2008), which have negative influences on participation intentions. We summarize the potential interrelationships of these constructs, according to our theoretical expectations, in our hypothetical structural model in Figure 2.

In addition to testing our proposed comprehensive model from Figure 2, we seek to estimate the relative importance of the latent constructs for predicting intentions to participate in mobile surveys. If we do so, we might offer recommendations about how to increase response rates to mobile surveys.

Method

Instrument Development

To develop the scales, we proceeded through a series of steps. First, we generated items to measure the nine constructs in our hypothetical model. For the behavioral intentions (6 initial items), attitudes (12 items), and subjective norms (3 items) constructs, we followed the procedures and wording suggested by Ajzen (2002) and Voss, Spangenberg, and Grohmann (2003). The reflective measures of perceived usefulness (12 items) and ease of use (9 items) come from scales developed by Bosnjak, Obermeier, and Tuten (2006), Davis (1989, 1993), and Moon and Kim (2001). The perceived costs (9 items) measure is based on research by Cheong and Park (2005) and Porter and Donthu (2006). For perceived enjoyment (reflective, 9 items), we turn to work by Dabholkar and Bagozzi (2002), Davis et al. (1992), Childers, Carr, Peck, and Carson (2001), and Moon and Kim (2001).

Furthermore, studies by Dibbern, Heinzl, and Schaub (2007) and Lu et al. (2008) provide the starting point for constructing the eight items that we use to measure perceived trustworthiness. Finally, we assessed self-congruity with three direct congruity measures suggested by Sirgy et al. (1997). We provide the full set of initially developed item wordings, along with their sources, in Appendix A.

Second, we undertook a pilot test of these scales with 320 German-speaking participants of a consumer panel who own mobile phones that are technically enabled to access the mobile Internet. In the web-based vignette study, the respondents first viewed photos of mobile devices that showed what a prototypical mobile survey question might look like. Then, the participants were to imagine being solicited to participate in mobile consumer panel studies on a regular basis, that is, once a month for at least 12 months. Consistent with the principle of compatibility (Ajzen & Fishbein, 1980), the items that measure the hypothetical model constructs relate specifically to the behavior described in the vignette.

After eliminating items with low part-to-whole correlations, suspicious distributional characteristics, or large standardized residuals, we find Cronbach's α reliabilities for the individual scales that are consistently high (greater than .80). To assess construct validity, we subject the scales to a confirmatory factor analyses (CFA) with four indicators for attitudes, two indicators of subjective norms, and three indicators per construct for all the other components (see Appendix A). The measurement model consists of the eight antecedents of intention and behavior, all of them were allowed to intercorrelate. The CFAs use EQS 6.1b (Bentler, 2006). Because the data violate multivariate normality (Mardia's coefficient = 177.58, normalized estimate = 44.96), we turn to the maximum likelihood robust estimation method (Satorra & Bentler, 1994) and use the raw data as input, from which the EQS program computes the respective covariance matrices. The resulting measurement model is consistent with our hypothesized structure. The Satorra-Bentler scaled χ^2 (SB-χ2 = 320.07, df = 224, $p < .01$, SB-$\chi^2/df = 1.43$) and the fit indices (robust confirmatory fit index [RCFI] = .99; nonnormed fit index [NNFI] = .98; root mean square error of approximation [RMSEA] = .04, 90% confidence interval [CI]: .03, .05) all indicate a good fit. The factor loadings of the indicators for each construct are statistically significant and sufficiently high (greater than .8, except for one self-congruity item, which is .78) with little variation. The final questionnaire for our main study therefore contains 27 questions to measure the constructs of interest (see Appendix A), as well as some demographic and other related questions.

Subjects and Procedure

The main study consists of two parts. In the first part, we use web-based questionnaires to assess the relevant predictors that constitute the nine components, as hypothesized in the integrative model, of participating in mobile surveys. We collected these data during August 2008 from 272 German-speaking members of a web-based consumer panel. All members of this panel agreed to provide their mobile phone numbers and be contacted for survey purposes (e.g., receive reminders via SMS/text messaging).

In the second part of the study, we measure actual participation in a mobile phone study about a salient topic at the time of measurement, that is, the 2008 Olympic Summer Games. Approximately a week after the first web-based questionnaire was completed, every participant received an invitation to participate in a single mobile survey of 10 questions. The question formats varied and were graphically optimized for contemporary mobile devices. Of the participants who completed the first questionnaire, 103 also completed the second, yielding a 37.9% participation rate.

In the initial sample, 47% of the subjects were men and 53% women. On average, they were 45.6 years of age (SD = 10.1), with a range between 19 and 73 years. Their educational level largely matched that of the general German population: 18% had at least a college degree, and another

20% had a diploma from German secondary school that qualified them for university admission or matriculation. Most (98%) respondents never participated in a mobile survey before, 96% cover the costs of their mobile phone usage on their own, and 49% never used the mobile Internet previously.

Results

Measurement Model

To assess the construct validity of the data we collected for our main study, we subjected the scales of each model to a CFA with all indicators, except the behavioral single-item measure and the intention indicators. The measurement model stems from our pilot study and consists of eight latent factors, all of them were allowed to intercorrelate (Appendix B contains the correlation matrix). The CFAs again rely on EQS 6.1b (Bentler, 2006). Because the data violate multivariate normality (Mardia's coefficient = 235.36, normalized estimate = 54.94), the maximum likelihood [ML] robust estimation method (Satorra & Bentler, 1994) was used and raw data were used, from which the EQS program computes the covariance matrices.

The measurement model is consistent with our hypothesized structure and the pilot study results. The Satorra-Bentler scaled χ^2 and other fit statistics (SB-χ^2 = 242.99, df = 224, p = .18, SB-χ^2/df = 1.08, RCFI = .99; NNFI = .99; RMSEA = .02, 90% CI: .00, .03) indicate a good fit. With a few exceptions (two reflective indicators of perceived trustworthiness), the factor loadings of the indicators are significant and sufficiently high (greater than .8), with little variation.

Structural Model Fit Summary

Because the data violate multivariate normality (Mardia's coefficient = 286.78; normalized estimate = 59.76) and we have a rather small sample size, we estimate the structural models with the maximum likelihood robust estimation method (Satorra & Bentler, 1994), with raw data as input, from which we compute the covariance matrices. For all these analyses, we use EQS 6.1b (Bentler, 2006). The structural model fits the data well (SB-χ^2 = 406.95, df = 296, $p < .01$, SB-χ^2/df = 1.37; RCFI = .99; NNFI = .98; RMSEA = .04; 90% CI: .03, .05).

Structural model path coefficient estimates. In Figure 3, we illustrate the structural model that we test, along with the estimated standardized path coefficients and coefficients of determination (R^2).

With respect to the theoretical structure, not all relations are significant. Ordered according to the magnitude of their standardized path coefficients, we find that perceived enjoyment (.409), perceived trustworthiness (.248), behavioral attitudes (.243), and self-congruity (.151) are the most important direct predictors of the willingness to participate in mobile surveys. In contrast, the two utilitarian factors, perceived usefulness and perceived costs, do not exhibit a direct relationship to participation intentions above the 5% chance level. Moreover, subjective norms, in contrast with our expectations, does not relate significantly to the willingness to take part in mobile surveys.

Intention–Behavior Relationship

The high point–biserial correlation coefficient of .34 indicates that the relationship between the willingness to participate in mobile surveys and actual participation is highly significant and of medium size. We corroborate its statistical significance with a binary logistic regression analysis (χ^2 = 37.07, df = 1, N = 272, $p \leq .01$; OR = 1.16, 95% CI: 1.09–1.22; Nagelkerke's R^2 = .160).

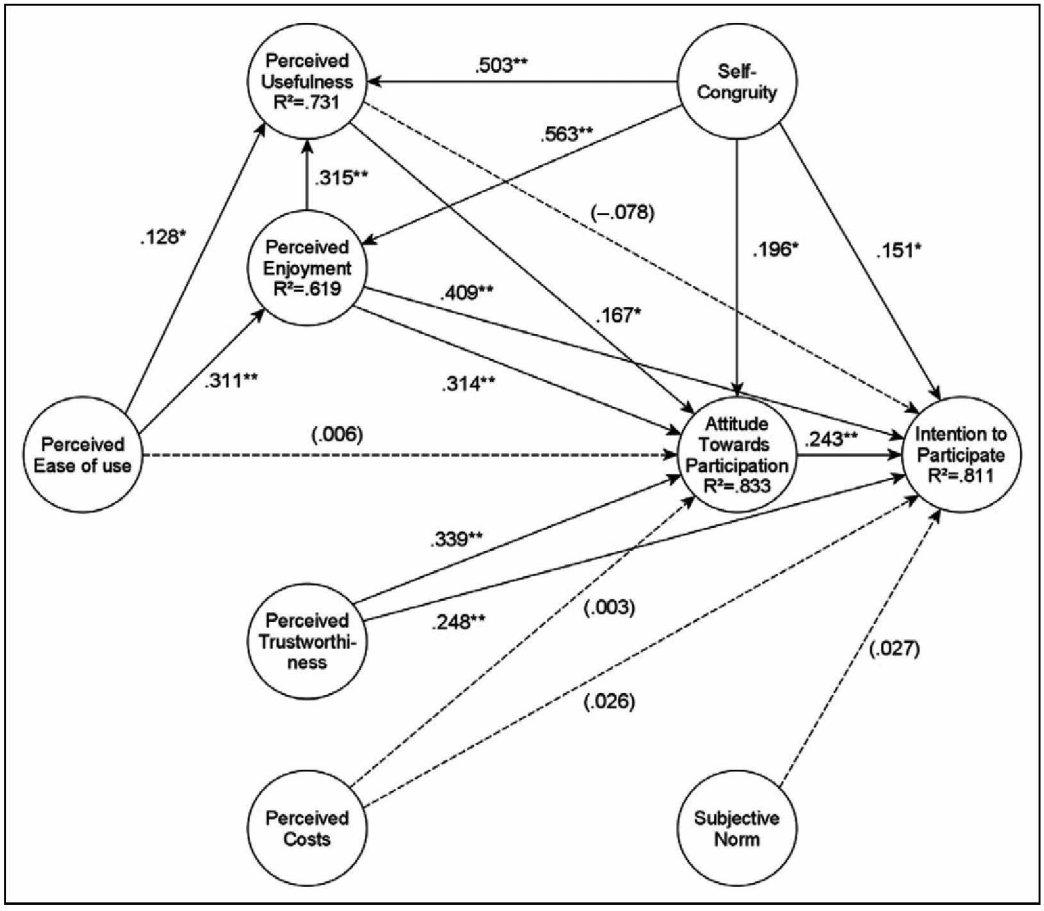

Figure 3. Structural model of participation in mobile surveys with standardized path coefficients ($N = 272$). Notes: Solid arrows indicate significant paths; dashed arrows represent insignificant influences. For clarity, this figure does not depict the measurement models and cross-correlations between exogenous variables. A full correlation matrix appears in Appendix B.

Discussion and Overview

The results of this study indicate that the extended TAM we propose offers a suitable heuristic framework for explaining both intentions to participate in mobile surveys and actual participation. Of the six factors we propose as influential, the hedonic, affective, self-expressive, and trust-related ones emerge as important determinants of the propensity to participate. Utilitarian aspects, such as cost considerations and the perceived usefulness of using the mobile mode for surveys, as well as considerations involving the perceived social pressure, surprisingly do not appear to exert a significant influence.

These results therefore offer some suggestions about ways to influence people's decision to participate in mobile surveys. Because the propensity to respond seems primarily a matter of hedonic, affective, self-expressive, and trust-related factors, survey researchers must address these four constructs through persuasive appeals. For example, to enhance hedonic and affective factors, messages might focus on the positive consequences of participation, such as enjoying the survey itself. Self-expressive appeals mainly stress the lifestyle and value attributes of stereotypical idealized persons (Johar & Sirgy, 1991); therefore, testimonials by aspirational spokespersons could be effective in

convincing these respondents to participate. Finally, trust-inducing measures and procedures receive ample coverage in survey methodology literature (e.g., Dillman, 2007); they appear to apply to mobile survey contexts as well.

Moreover, our research suggests that the costs incurred by participating and considerations about the usefulness of the mobile mode are not part of the decision calculus to participate in mobile surveys. Consequently, survey researchers need not focus on such aspects in their efforts to encourage potential respondents to participate.

Further research should test the effectiveness of these different measures and procedures to increase respondents' propensity to participate, using experimental approaches. For example, we posit that persuasive appeals that address hedonic and affective consequences of participation will outperform utilitarian appeals, but we require further testing to confirm this assertion. Furthermore, we need more clarity about the underlying cognitive foundations of our model components and their interrelationships, which would offer a more fine-grained understanding of participation decision processes.

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Declaration of Conflicting Interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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Appendix A Wording of Items

	Instrument development phase			Main study			
	Item code			Item code			
Nr.	Raw	New	Text	Raw	New	Text	Wording partly borrowed from
Perceived Enjoyment							
1	PE_1		Filling out questionnaires using the mobile phone would be entertaining for me				Dabholkar and Bagozzi (2002)
2	PE_2		It would be pleasant to participate in mobile surveys				Davis, Bagozzi, and Warshaw (1992)
3	PE_3	PE_1	It would be fun for me to fill out questionnaires using a mobile phone	PE_2	PE_1	It would be fun for me to fill out questionnaires using a mobile phone	Davis et al. (1992)
4	PE_4	PE_2	Filling out questionnaires using a mobile phone would be interesting to me	PE_3	PE_2	Filling out questionnaires using a mobile phone would be interesting to me	Childers, Carr, Peck, and Carson (2001)
5	PE_5		Answering questionnaires over a mobile phone would be gratifying				Davis et al. (1992)
6	PE_6	PE_3	It would be exciting to participate in mobile surveys	PE_4	PE_3	It would be exciting to participate in mobile surveys	Childers et al. (2001)
7	PE_7		Time would fly when I participated in mobile surveys				Moon & Kim, (2001)
8	PE_8		I would be curious to fill out mobile questionnaires				Moon and Kim (2001)
9	PE_9		I would feel good when filling out mobile questionnaires				Moon and Kim (2001)
Perceived Ease of Use							
10	PEOU_1	PEOU_1	It would be easy to learn how to answer questionnaires over the mobile phone	PEOU_1	PEOU_1	It would be easy to learn how to answer questionnaires over the mobile phone	Moon and Kim (2001)

(continued)

(continued)

	Instrument development phase			Main study			
	Item code			Item code			
Nr.	Raw	New	Text	Raw	New	Text	Wording partly borrowed from
11	PEOU_2		It would be easy for me to get my cell phone to do what I want when responding to mobile surveys				Davis (1989)
12	PEOU_3		Participating in mobile surveys would be complicated [*R*]				Davis (1989)
13	PEOU_4		I could easily operate a cellular device to participate in a mobile survey				Davis (1989)
14	PEOU_5	PEOU_2	I would be quickly proficient in filling out questionnaires over the mobile phone	PEOU_2	PEOU_2	I would be quickly proficient in filling out questionnaires over the mobile phone	Davis (1989)
15	PEOU_6		Without the help of others, I would not be able to participate in mobile surveys [*R*]				Moon and Kim (2001)
16	PEOU_7	PEOU_3	It is clear and understandable how to participate in mobile surveys	PEOU_3	PEOU_3	It is clear and understandable how to participate in mobile surveys	Davis (1989)
17	PEOU_8		It would be easy to fill out questionnaires using my cellular device				Davis (1989)
18	PEOU_9		Participating in mobile surveys would be easy				Davis (1989)
Subjective Norm							
19	SNI_1		People whose opinion I value would recommend that I participate in the mobile surveys described				Ajzen (2002)

(continued)

(continued)

	Instrument development phase			Main study			
	Item code			Item code			
Nr.	Raw	New	Text	Raw	New	Text	Wording partly borrowed from
20	SND_2	SN_1	In the situation described, people who are important to me would recommend that I (participate using the mobile phone–not participate using the mobile phone)	SN_2	SN_1	In the situation described, people who are important to me would recommend that I (participate using the mobile phone–not participate using the mobile phone)	Ajzen (2002)
21	SND_3	SN_2	Most people whose opinion I value would participate in the mobile surveys described (very likely–very unlikely)	SN_3	SN_2	Most people whose opinion I value would participate in the mobile surveys described (very likely–very unlikely)	Ajzen (2002)
Perceived Usefulness							
22	PU_1		Mobile surveys would allow me to participate in surveys more quickly				Davis (1989)
23	PU_2		Mobile surveys would enable me to participate in more surveys				Davis (1989)
24	PU_3	PU_1	Mobile surveys would largely facilitate my participation in research	PU_2	PU_1	Mobile surveys would largely facilitate my participation in research	Davis (1989)
25	PU_4	PU_2	By having the opportunity to fill out questionnaires over the mobile phone, I could better participate in research studies	PU_3	PU_2	By having the opportunity to fill out questionnaires over the mobile phone, I could better participate in research studies	Davis (1989)
26	PU_5	PU_3	I could participate more effectively in research studies with the aid of mobile surveys	PU_4	PU_3	I could participate more effectively in research studies with the aid of mobile surveys	Davis (1989)
27	PU_6		I would save time when filling out questionnaires if I could use my mobile device to do so				Davis (1989)
28	PU_7		By answering questionnaires using my mobile phone, I could choose the time to respond				New

(continued)

(continued)

	Instrument development phase			Main study			
	Item code			Item code			
Nr.	Raw	New	Text	Raw	New	Text	Wording partly borrowed from
29	PU_8		By answering questionnaires using my mobile phone, I could choose the place from which to respond				New
30	PU_9		I would be more flexible in choosing the place from which to respond if I had the opportunity to use my mobile phone				New
31	PU_10		I would be more flexible in choosing the time to respond when given the opportunity to participate in a mobile survey				New
32	PU_11		It would be useful for me to participate in mobile surveys				Davis (1989)
33	PU_12		Answering questionnaires on my cell phone would be handy				Bosnjak, Obermeier, and Tuten (2006)
Perceived Costs							
34	PC_1		I am not sure if participating in mobile surveys would incur financial costs that I would have to cover				New
35	PC_2		I think that I would incur financial costs if I participated in mobile surveys				New
36	PC_3		I am not sure how much it would cost if I participated in mobile surveys				New
37	PC_4		It is unclear to me how much my participation in mobile surveys would cost to me				New
38	PC_5	PC_1	When participating in mobile surveys, I would be concerned about the costs	PC_1	PC_1	When participating in mobile surveys, I would be concerned about the costs	New

(continued)

(continued)

	Instrument development phase			Main study			
	Item code			Item code			
Nr.	Raw	New	Text	Raw	New	Text	Wording partly borrowed from
39	PC_6	PC_2	I think that the costs of participating in mobile surveys would be a burden to me	PC_2	PC_2	I think that the costs of participating in mobile surveys would be burdensome to me	Cheong and Park (2005)
40	PC_7		I cannot afford to participate in mobile surveys				Porter and Donthu (2006)
41	PC_8	PC_3	I think that it would be costly to participate in mobile surveys	PC_3	PC_3	I think that it would be costly to participate in mobile surveys	Cheong and Park (2005)
42	PC_9		Participating in mobile surveys is too expensive for me				Cheong and Park (2005)
Self-Congruity							
43	GASC_1	SC_1	People participating in mobile surveys are much like me	GASC_1	SC_1	People participating in mobile surveys are much like me	New
44	GASC_2	SC_2	I can identify with those who decide to participate in mobile surveys	GASC_2	SC_2	I can identify with those who decide to participate in mobile surveys	New
45	GASC_3	SC_3	I see myself as a typical participant of mobile surveys	GASC_3	SC_3	I see myself as a typical participant of mobile surveys	New
Perceived Trustworthiness							
46	TA_1	PT_1	I am concerned about my anonymity when participating in mobile surveys [*R*]	TA_1	PT_1	I am concerned about my anonymity when participating in mobile surveys [*R*]	New
47	TA_2	PT_2	Due to the appropriate technical measures, my data are well protected when I participate in mobile surveys	TA_2	PT_2	Due to the appropriate technical measures, my data are well protected when I participate in mobile surveys	Lu, Liu, Yu, and Wang (2008)
48	TA_3	PT_3	Mobile surveys are trustworthy	TA_3	PT_3	Mobile surveys are trustworthy	New
49	TA_4		I am concerned about my data being misused when I participate in mobile surveys [*R*]				Dibbern, Heinzl, and Schaub (2007)
50	TA_5		While filling out mobile questionnaires, I am reluctant to provide personal data [*R*]				Dibbern et al. (2007)

(continued)

(continued)

Nr.	Instrument development phase: Item code Raw	Instrument development phase: Item code New	Instrument development phase: Text	Main study: Item code Raw	Main study: Item code New	Main study: Text	Wording partly borrowed from
51	TA_6		I am confident that the appropriate security measures are implemented to protect my personal data from third-party access				Lu et al. (2008)
52	TA_7		Mobile surveys do have a scientific, noncommercial use				New
53	TA_8		Mobile surveys are an appropriate means to participate in studies securely				New
Attitude toward Participation							
			Being a part of the panel, participating in a mobile survey once per month over twelve months would be:			Participating in mobile surveys would be:	
54	ATTH_1	ATT_1	Pleasant–unpleasant	ATT_1	ATT_1	Pleasant–unpleasant	Voss, Spangenberg, and Grohmann (2003)
55	ATTH_2		Funny–embarrassing				Voss et al. (2003)
56	ATTH_3		Exciting–boring				Voss et al. (2003)
57	ATTH_4		Enjoyable–unenjoyable				Voss et al. (2003)
58	ATTH_5		Absorbing–barren				Voss et al. (2003)
59	ATTU_1	ATT_2	Practical–impractical	ATT_2	ATT_2	Practical–impractical	Voss et al. (2003)
60	ATTU_2		Useful–useless				Voss et al. (2003)
61	ATTU_3		Necessary–unnecessary				Voss et al. (2003)
62	ATTU_4		Helpful–not helpful				Voss et al. (2003)
63	ATTU_5		Effective–ineffective				Voss et al. (2003)
64	ATTG_1	ATT_3	Positive–negative	ATT_5	ATT_3	Positive–negative	Davis (1986)
65	ATTG_2	ATT_4	Good–bad	ATT_6	ATT_4	Good–bad	Davis (1986)
Intention to Participate							
66	INT_1		I would plan to participate in the mobile panel surveys				Ajzen (2002)

(continued)

(continued)

	Instrument development phase			Main study			
	Item code			Item code			
Nr.	Raw	New	Text	Raw	New	Text	Wording partly borrowed from
67	INT_2		I would intend to participate in the mobile panel surveys				Ajzen (2002)
68	INT_3		I would try to participate in each and every survey of the twelve mobile panel survey waves				Ajzen (2002)
69	INT_4	INT_1	When requested to participate, I would do so in each and every wave of the mobile panel survey (very likely–very unlikely)	IN_1	INT_1	When requested to participate in mobile surveys, I would do so (very likely–very unlikely)	Ajzen (2002)
70	INT_5	INT_2	I can imagine participating in the mobile panel surveys each and every time I was requested to do so (definitely true–definitely not true)	INT_2	INT_2	I can imagine participating in the mobile surveys regularly (definitely true–definitely not true)	Ajzen (2002)
71	INT_6	INT_3	In the situation described, I would intend to participate each and every time	INT_3	INT_3	If requested to participate in mobile surveys once per month, how often do you think you would participate? (always–never)	Ajzen (2002)

NOTE: The original wording of the items, in German, are available on request. The "Raw" columns indicate the original variable labels in the raw data sets. The "New" columns contain the item labels used in the data sets for the analyses. All data sets are available on request.

Appendix B Correlations between all indicators of the main study

	Perceived enjoyment			Perceived usefulness			Perceived ease of use			Perceived trustworthiness			
	PE_1	PE_2	PE_3	PU_1	PU_2	PU_3	PEOU_1	PEOU_2	PEOU_3	PT_1	PT_2	PT_3	PC_1
PE_1	1.000												
PE_2	0.934	1.000											
PE_3	0.925	0.943	1.000										
PU_1	0.689	0.686	0.698	1.000									
PU_2	0.675	0.685	0.688	0.860	1.000								
PU_3	0.700	0.715	0.701	0.832	0.876	1.000							
PEOU_1	0.563	0.599	0.550	0.530	0.528	0.564	1 000						
PEOU_2	0.563	0.590	0.559	0.500	0.535	0.558	0.885	1.000					
PEOU_3	0.573	0.576	0.556	0.511	0.504	0.534	0.809	0.753	1.000				
PT_1	0.269	0.297	0.379	0.300	0.311	0.334	0.335	0.280	0.305	1.000			
PT_2	0.576	0.538	0.499	0.488	0.513	0.552	0.434	0.446	0.446	0.299	1.000		
PT_3	0.645	0.662	0.639	0.651	0.680	0.691	0.575	0.547	0.540	0.450	0.636	1.000	
PC_1	−0.207	−0.198	−0.217	−0.159	−0.164	−0.172	−0.104	−0.086	−0.127	−0.241	−0.157	−0.224	1.000
PC_2	−0.336	−0.348	−0.378	−0.314	−0.279	−0.342	−0 196	−0.199	−0.207	−0.248	−0.270	−0.322	0.773
PC_3	−0.308	−0.321	−0.340	−0.252	−0.208	−0.280	−0.137	−0.166	−0.184	−0.239	−0.218	−0.286	0.756
SN_1	0.598	0.596	0.577	0.620	0.663	0.635	0.442	0.488	0.424	0.277	0.479	0.607	−0.196
SN_2	0.571	0.576	0.546	0.600	0.637	0.609	0.433	0.459	0.422	0.240	0.473	0.557	−0.177
SC_1	0.610	0.612	0.634	0.629	0.635	0.646	0.470	0.472	0.498	0.229	0.443	0.612	−0.240
SC_2	0.635	0.627	0.644	0.684	0.659	0.676	0.480	0.471	0.502	0.309	0.495	0.670	−0.217
SC_3	0.664	0.657	0.674	0.698	0.671	0.699	0.517	0.522	0.545	0.281	0.519	0.658	−0.238
ATT_1	0.755	0.773	0.777	0.701	0.735	0.759	0.573	0.551	0.548	0.359	0.547	0.729	−0.233
ATT_2	0.721	0.736	0.727	0.708	0.732	0.730	0.581	0.563	0 564	0.336	0.537	0.725	−0.175
ATT_3	0.723	0.725	0.724	0.673	0.709	0.717	0.582	0.559	0.550	0.341	0.540	0.757	−0.245
ATT_4	0.76S	0.770	0.772	0.690	0.728	0.734	0.562	0.557	0.525	0.373	0.557	0.769	−0.208
INT_1	0.761	0.784	0.742	0.666	0.661	0.713	0.588	0.562	0.540	0.367	0.540	0.720	−0.161
INT_2	0.803	0.825	0.794	0.682	0.667	0.715	0.583	0.576	0.553	0.349	0.561	0.729	−0.211
INT_3	0.752	0.764	0.728	0.599	0.628	0.653	0.588	0.580	0.545	0.342	0.521	0.700	−0.150
M	4.721	4.776	4.647	4.316	4.386	4.544	5.463	5.537	5.107	3.930	4.607	4.938	5.603
SD	2.066	2.058	2.074	2.052	1.980	1.974	1.591	1.623	1.816	1.787	1.691	1.614	1.828

	Perceived costs		Subjective norm		Self-congruity			Attitude toward participation				Intention to participate		
Variable	PC_2	PC_3	SN_1	SN_2	SC_1	SC_2	SC_3	ATT_1	ATT_2	ATT_3	ATT_4	INT_1	INT_2	INT_3
PE_1														
PE_2														
PE_3														
PU_1														
PU_2														
PU_3														
PEOU_1														
PEOU_2														
PEOU_3														
PT_1														
PT_2														
PT_3														
PC_1														
PC_2	1.000													
PC_3	0.858	1.000												
SN_1	−0.291	−0.249	1.000											
SN_2	−0.306	−0.270	0.873	1.000										
SC_1	−0.320	−0.284	0.507	0.509	1.000									
SC_2	−0.333	−0.306	0.576	0.578	0.849	1.000								
SC_3	−0.361	−0.333	0.572	0.573	0.790	0.807	1.000							
ATT_1	−0.375	−0.298	0.550	0.531	0.682	0.702	0.716	1.000						
ATT_2	−0.340	−0.271	0.569	0.530	0.650	0.667	0.673	0.873	1.000					
ATT_3	−0.364	−0.306	0.570	0.540	0.681	0.700	0.695	0.876	0.837	1.000				
ATT_4	−0.331	−0.267	0.586	0.555	0.694	0.718	0.714	0.913	0.866	0.910	1.000			
INT_1	−0.323	−0.288	0.575	0.520	0.636	0.693	0.673	0.763	0.761	0.744	0.779	1.000		
INT_2	−0.358	−0.347	0.614	0.577	0.675	0.716	0.753	0.782	0.782	0.781	0.761	0.882	1.000	
INT_3	−0.286	−0.286	0.591	0.528	0.593	0.653	0.650	0.732	0.721	0.736	0.761	0.923	0.878	1.000
M	5.331	5.430	3.960	3.875	4.074	4.246	3.713	4.540	4.735	4.702	4.695	5.055	4.651	5.040
SD	1.798	1.805	1.849	1.798	1.845	1.865	1.909	1.750	1.855	1.624	1.685	2.064	2.040	1.988

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